



Biomass samples are being used to assess yield results in relation to trialled N strategies.



Soil sampling at DSITI's trial sites is undertaken to 120cm requiring deep soil coring.

## Collaborative research to maximise profit from nitrogen

*Efficient use of nitrogen (N) opens doors to greater productivity, increased profit and reduced environmental impact, but what is the best way forward for particular farm systems?*

This is the key focus of the national *More Profit from Nitrogen Program (MPfN)*, a four year partnership between Australia's major intensive users of nitrogenous fertilisers: cotton, dairy, sugar and horticulture, led by the Cotton and Research Development Corporation (CRDC).

Supported by \$5.8 million from the Australian Government's Department of Agriculture and Water Resources Rural R&D for Profit programme, MPfN is in its first year of delivering findings from 10 research projects.

MPfN has been designed to engage with producers, with over 31 trial sites established to undertake research, and demonstrate tested practices and host field days to encourage farmer input.

**Program research is being undertaken under three focus areas for improving productivity and profitability through N use. These are:**

- Greater knowledge and understanding of the interplay of soil, weather, climatic and farm management factors to optimise N formulation, rate and timing in relation to irrigation practices;

- Greater knowledge and understanding of the contribution (quantifying rate and timing) of N mineralisation to a crop or pasture's nitrogen budget; and
- Greater knowledge and understanding of how enhanced efficiency fertiliser (EEF) formulations can better match a crop or pasture's specific N requirements by developing new ones and optimising existing ones.

**For cane growers, SRA has supported three projects under the MPfN Program.**

1. The Queensland Government's Department of Agriculture and Fisheries (DAF) is investigating novel formulations and management techniques to optimise N application for cane crop requirements.

Using cutting edge plant accelerator studies, laboratory micro-dialysis, and rainfall simulation techniques, it is looking to develop new formulations to better match N release to crop uptake demands throughout seasons by controlling nitrogen transformations and solubility, and combating N "leakiness" to the environment via improved, more targeted N formulations.

Trial and demonstration sites will be established in the second and third years in the Herbert/ Wet Tropics and Burdekin catchments.

Dr Matt Redding (Project Research Leader) describes his team's objectives: "The key is to formulate products more suited to tropical conditions where high temperatures and intense rainfall tend to decrease the effectiveness of existing technologies. The set of requirements for nitrogen supply to sugar production are very specific, and we hope to tailor technologies to match those – without introducing chemical or micro-plastic residue issues."

2. Similarly, the Queensland Government's Department of Science, Information, Technology and Innovation (DSITI) project, *Smart Blending of enhanced efficiency fertilisers (EEF) to maximise sugar cane profitability* is concentrating on fertiliser formulations to better match N release to the N uptake dynamics of cane.

This research is investigating optimal blending ratios of existing polymer coated urea (PCU) with conventional urea under various soil and seasonal conditions. While the use of EEFs is currently seen as too expensive by many growers, the project will evaluate the production and profitability gains to be made from blending rather than single product application.

DSITI's Dr Weijin Wang (Project Research Leader) said: "The need to select the most suitable products and optimal blending ratios for a specific farm will be addressed through the development of a decision support tool by the project. Having findings from research sites in Innisfail, Tully, Ingham, Mackay and Bundaberg, and contributions from the other sugar projects involved in MPfN, we are gaining a better understanding of the common and differing soil and weather factors across regions which need to be reflected in the decision making. We are analysing the N dynamics within the plant root zone down to a depth of 1.2 metres and in plant biomass throughout various stages of plant growth."

3. Finally, the NSW's Department of Primary Industry is concentrating its work in the subtropical cane growing regions of the State. It seeks to reduce the cost of more expensive EEF applications by improving the ease by which farmers can make more informed precision decisions.

"If we can better determine when and how much N is supplied from organic matter through mineralisation, throughout the soil profile, we can better match current application rates of PCUs so that N is available to the plant in the right form at the right times, making it more cost effective," said project leader, Dr Lukas Van Zweiten.

Soil sampling undertaken across 30 sites is informing the development of new technologies to rapidly predict soil mineralisation and <sup>15</sup>N stable isotope technology is being used on three core research sites, located on commercial farms in the Tweed, Richmond and Clarence catchments, to assess contributions of fertiliser N, versus soil present N, to crop uptake. Research outcomes will include development of a simple model for farmers that can predict the economic returns of using an EEF product based upon current pricing.

The results of all three MPfN research projects will be incorporated into the industry SIX EASY STEPS guidelines and will contribute to the development of a decision support model.

"With research and demonstration underway in all cane growing regions, farmers are encouraged to become involved in the project, as practical relevance to farm management and assessing accurate profitability gains for the farm business are paramount to the ongoing legacy of the More Profit from Nitrogen Program," said Marguerite White, Science Coordinator for the program.

More can be found on the sugar projects by visiting the new SRA website [www.sugarresearch.com.au/research-portfolio](http://www.sugarresearch.com.au/research-portfolio) under Key Focus Area 2 or the broader MPfN Program at [www.crdc.com.au/more-profit-nitrogen](http://www.crdc.com.au/more-profit-nitrogen).



**Left:** The DISITI team came together recently in Brisbane to collaborate on research findings to date and plan for the year ahead.

**Back:** Felice Driver (SRA), Stephen Ginns (QDAF), Charlie Walker (Incitec Pivot), Marijke Heenan (DSITI), Steven Reeves (DSITI), Robert Slugget (Farmacist).

**Front:** Lawrence Di Bella (HCPSSL), Charissa Rixon (TRAP Services), Kylie Bezzina (Farmacist), Fang You (DSITI/ University of Queensland).